In re Patent Application of:
SMITH ET AL
Serial No. **10/760,996**
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In the Claims:

1. - 12. (canceled)

13. (New) A method of delivering span power by way of a plurality of telecommunication wireline segments to respective ones of a plurality of remote telecommunication terminals, said method comprising the steps of:

(a) coupling said plurality of telecommunication wireline segments to a span power bus, so that span power is coupled from said span power bus to said plurality of telecommunication wireline segments;

(b) coupling respective ones of said plurality of telecommunication wireline segments to respective ones of said plurality of remote telecommunication terminals, so that said span power is delivered by said plurality of telecommunication wireline segments to said respective ones of said plurality of remote telecommunication terminals;

(c) coupling respective ones of said plurality of telecommunication wireline segments to respective ones of a plurality of ground fault detection and isolation circuits, a respective ground fault being capable of causing electrical current in excess of normal load current to flow in a remote telecommunication terminal that is connected to the respective telecommunication wireline segment in which the ground fault has occurred, and causing a reduction in said span power to a level that prevents proper operation of a remote telecommunication terminal that is coupled to a telecommunication wireline segment in which no ground fault has occurred;

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(d) causing said ground fault detection and isolation circuits to monitor said plurality of telecommunication wireline segments for the occurrence of a ground fault therein; and

(e) in response to a ground fault detection and isolation circuit detecting, in step (d), the occurrence of a ground fault in an associated telecommunication wireline segment to which said ground fault detection and isolation circuit is coupled, causing said ground fault detection and isolation circuit to decouple and isolate said associated telecommunication wireline segment from said span power bus, so as to prevent said reduction in said span power being delivered by others of said plurality of telecommunication wireline segments, in which no ground fault has been detected as having occurred, to remote telecommunication terminals coupled thereto, thereby preventing misoperation of said remote telecommunication terminals coupled to said others of said plurality of telecommunication wireline segments.

14. (New) The method according to claim 13, wherein step (e) further comprises, in response to said ground fault detection and isolation circuit failing to detect the occurrence of a ground fault on said associated telecommunication wireline segment in step (d), causing said ground fault detection and isolation circuit to maintain said associated telecommunication wireline segment coupled with said span power bus and thus deliver said span power to a remote telecommunication terminal coupled to said associated telecommunication wireline segment, so that normal load current may be supplied to said remote telecommunication terminal.

15. (New) The method according to claim 13, wherein step (d) comprises the steps of:

(d1) at said ground fault detection and isolation circuit, measuring a first parameter representative of current flowing in a first segment portion of said associated telecommunication wireline segment to said remote telecommunication terminal, and measuring a second parameter representative of current flowing in a second segment portion of said associated telecommunication wireline segment from said remote telecommunication terminal, and

(d2) at said ground fault detection and isolation circuit, in response a difference in said first and second parameters, providing an output representative of the occurrence of a ground fault in said associated telecommunication wireline segment, and wherein

step (e) comprises causing said ground fault detection and isolation circuit to decouple, and thereby isolate, said associated telecommunication wireline segment from said span power bus, in response to step (d1) providing said output representative of the occurrence of a ground fault in said associated telecommunication wireline segment.

16. (New) The method according to claim 15, wherein step (d1) comprises coupling a first sense resistor in said first segment portion of said associated telecommunication wireline segment and generating a first output voltage representative of current flowing in said first sense resistor, and coupling a second sense resistor in said second segment portion of said associated telecommunication wireline segment and generating a

second output voltage representative of current flowing in said second sense resistor, and step (d2) comprises detecting a difference between said first and second output voltages, and generating said output representative of a ground fault in said associated telecommunication wireline segment, in response to a prescribed difference between said first and second output voltages.

17. (New) The method according to claim 16, wherein step (d1) comprises coupling said first sense resistor to a current mirror that is operative to generate an output current in accordance with current flowing through said first sense resistor, and coupling said current mirror to a differential amplifier, which generates an output for controlling current through a controlled current device coupled in circuit with said current mirror and an output resistor across which said first output voltage is produced.

18. (New) The method according to claim 17, wherein step (d1) further comprises coupling a voltage across said second sense resistor to a differential amplifier, which produces said second output voltage, and step (d2) comprises differentially combining said first and second output voltages to provide said output representative of a ground fault in said associated telecommunication wireline segment.

19. (New) A method of delivering power, applied from an electrical power source to a span power bus, by way of a plurality

of telecommunication wireline segments to respective ones of a plurality of remote telecommunication terminals, said method comprising the steps of:

(a) coupling first portions of said plurality of telecommunication wireline segments to said span power bus, so that power is coupled from said span power bus to said first portions of said plurality of telecommunication wireline segments;

(b) coupling second portions of said plurality of telecommunication wireline segments to said respective ones of said plurality of remote telecommunication terminals, so that power coupled from said span power bus to said first portions of said plurality of telecommunication wireline segments is delivered by said second portions of said plurality of telecommunication wireline segments to said respective ones of said plurality of remote telecommunication terminals;

(c) coupling the first and second portions of respective ones of said plurality of telecommunication wireline segments to respective ones of a plurality of ground fault detection and isolation circuits;

(d) causing each ground fault detection and isolation circuit to monitor the respective telecommunication wireline segment to which said each ground fault detection and isolation circuit is coupled for the occurrence of a ground fault; and

(e) in response to a respective ground fault detection and isolation circuit detecting the occurrence of a ground fault on said respective telecommunication wireline segment in step (d), causing said respective ground fault detection and isolation circuit to perform the operation of decoupling, and thereby

isolating, said respective telecommunication wireline segment from said span power bus, said operation being effective to prevent a change in the power being delivered by others of said plurality of telecommunication wireline segments to remote telecommunication terminals coupled thereto, and thereby prevent misoperation of said remote telecommunication terminals coupled to said others of said plurality of telecommunication wireline segments.

20. (New) The method according to claim 19, wherein step (e) further comprises, in response to said respective ground fault detection and isolation circuit detecting the absence of a ground fault on said respective telecommunication wireline segment in step (d), causing said respective ground fault detection and isolation circuit to maintain said telecommunication wireline segment coupled with said span power bus, and thereby deliver power from said span power bus to a remote telecommunication terminal coupled to said telecommunication wireline segment, so that normal load current may be supplied to said remote telecommunication terminal.

21. (New) The method according to claim 19, wherein step (d) comprises the steps of:

(d1) at said each ground fault detection and isolation circuit, measuring a first parameter representative of current flowing in a first segment portion of said respective telecommunication wireline segment to said remote telecommunication terminal, and measuring a second parameter representative of current flowing in a second segment portion of

said respective telecommunication wireline segment from said remote telecommunication terminal, and

(d2) at said each ground fault detection and isolation circuit, in response a difference in said first and second parameters, providing an output representative of the occurrence of a ground fault in said respective telecommunication wireline segment, and wherein

step (e) comprises causing said respective ground fault detection and isolation circuit to decouple, and thereby isolate, said respective telecommunication wireline segment from said span power bus, in response to step (d1) providing said output representative of the occurrence of a ground fault in said respective telecommunication wireline segment.

22. (New) The method according to claim 21, wherein step (d1) comprises coupling a first sense resistor in said first segment portion of said respective telecommunication wireline segment and generating a first output voltage representative of current flowing in said first sense resistor, and coupling a second sense resistor in said second segment portion of said respective telecommunication wireline segment and generating a second output voltage representative of current flowing in said second sense resistor, and step (d2) comprises detecting a difference between said first and second output voltages, and generating said output representative of a ground fault in said respective telecommunication wireline segment, in response to a prescribed difference between said first and second output voltages.

23. (New) The method according to claim 22, wherein step (d1) comprises coupling said first sense resistor to a current mirror that is operative to generate an output current in accordance with current flowing through said first sense resistor, and coupling said current mirror to a differential amplifier, which generates an output for controlling current through a controlled current device coupled in circuit with said current mirror and an output resistor across which said first output voltage is produced.

24. (New) The method according to claim 23, wherein step (d1) further comprises coupling a voltage across said second sense resistor to a differential amplifier, which produces said second output voltage, and step (d2) comprises differentially combining said first and second output voltages to provide said output representative of a ground fault in said respective telecommunication wireline segment.

25. (New) A system for controlling delivery of span power supplied by a span power bus to respective ones of a plurality of remote telecommunication terminals, said system comprising:

a plurality of telecommunication wireline segments coupled to said span power bus, so that span power is coupled from said span power bus to said plurality of telecommunication wireline segments, respective ones of said plurality of telecommunication wireline segments being coupled to respective ones of said plurality of remote telecommunication terminals, so that said span

power is delivered by said plurality of telecommunication wireline segments to said respective ones of said plurality of remote telecommunication terminals; and

a plurality of ground fault detection and isolation circuits, coupled with respective ones of said plurality of telecommunication wireline segments between said span power bus and said plurality of remote telecommunication terminals, and being operative to monitor respective ones of said plurality of telecommunication wireline segments for the occurrence of a ground fault therein, a ground fault being capable of presenting a hazardous voltage condition to service personnel, causing electrical current in excess of normal load current to flow in a remote telecommunication terminal that is connected to the respective telecommunication wireline segment in which the ground fault has occurred, as well as producing a reduction of normal span power supplied by said span power bus and said telecommunication wireline segments, causing remote telecommunication terminals to malfunction; and wherein

a respective ground fault detection and isolation circuit is operative, in response to detecting the occurrence of a ground fault in an associated telecommunication wireline segment to which said respective ground fault detection and isolation circuit is coupled, to decouple and isolate said associated telecommunication wireline segment from said span power bus, so as to prevent said reduction in said span power being delivered by others of said plurality of telecommunication wireline segments, in which no ground fault has been detected as having occurred, to remote telecommunication terminals coupled thereto, thereby preventing

misoperation of said remote telecommunication terminals coupled to said others of said plurality of telecommunication wireline segments.

26. (New) The system according to claim 25, wherein said respective ground fault detection and isolation circuit is further operative, in response to failing to detect the occurrence of a ground fault in said associated telecommunication wireline segment, to maintain said associated telecommunication wireline segment coupled with said span power bus and thus maintain delivery of said span power by said associated telecommunication wireline segment to a remote telecommunication terminal coupled thereto, so that normal load current may be supplied to said remote telecommunication terminal.

27. (New) The system according to claim 25, wherein said respective ground fault detection and isolation circuit is operative to detect the occurrence of a ground fault in said associated telecommunication wireline segment and to decouple and isolate said associated telecommunication wireline segment from said span power bus by:

i- measuring a first parameter representative of current flowing in a first segment portion of said associated telecommunication wireline segment to said remote telecommunication terminal,

ii- measuring a second parameter representative of current flowing in a second segment portion of said associated telecommunication wireline segment from said remote

telecommunication terminal, and

iii- in response to detecting a difference in said first and second parameters - indicating the occurrence of a ground fault - decoupling, and thereby isolating, said associated telecommunication wireline segment from said span power bus.

28. (New) The system according to claim 27, wherein said respective ground fault detection and isolation circuit is operative to perform step i by coupling a first sense resistor in said first segment portion of said associated telecommunication wireline segment and generating a first output voltage representative of current flowing in said first sense resistor, is operative to perform step ii by coupling a second sense resistor in said second segment portion of said associated telecommunication wireline segment and generating a second output voltage representative of current flowing in said second sense resistor, and is operative to perform step iii by detecting a prescribed difference between said first and second output voltages - indicating the occurrence of a ground fault - and decoupling, and thereby isolating, said associated telecommunication wireline segment from said span power bus.

29. (New) The system according to claim 28, wherein said respective ground fault detection and isolation circuit is operative to perform step i by coupling said first sense resistor to a current mirror that is operative to generate an output current in accordance with current flowing through said first sense resistor, and coupling said current mirror to a differential

amplifier, which generates an output for controlling current through a controlled current device coupled in circuit with said current mirror and an output resistor across which said first output voltage is produced, and coupling a voltage across said second sense resistor to a differential amplifier, which produces said second output voltage, is operative to perform step ii by differentially combining said first and second output voltages, and is operative to perform step iii by detecting a prescribed difference between said first and second output voltages - indicating the occurrence of a ground fault - and decoupling, and thereby isolating, said associated telecommunication wireline segment from said span power bus.